Vol. 31, pp. 51–58 June 29, 1918

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON CLEMMYS.

BY ALBERT HAZEN WRIGHT.

The interesting record of Muhlenberg's Turtle in Rhode Island presented by Dr. H. L. Babcock in the April, 1917, Copeia prompted the writer to assemble all of our western New York records of that form and what we have of interest concerning its habits, breeding and distribution. These notes are forthcoming in another place and hence are omitted here. Subsequently, Mr. E. R. Dunn described a new species of *Clemmys* from North Carolina and this furnishes one of the occasions for these observations on the genus in general. His *Clemmys nuchalis* is herein compared with western New York material and held to be synonymous with *C. muhlenbergi* (Schoepff). *Clemmys marmorata* (B. & G.) is not treated in these remarks.

Clemmys muhlenbergi (Schoepff).

In his very interesting and valuable paper on reptiles and amphibians from the mountains of North Carolina, Mr. E. R. Dunn* records four Muhlenberg's Turtles, one from Linnville, N. C., at 4,200 feet altitude, and three from Brevard, N. C., at 2,100 feet altitude. He calls attention to the fact that these are at a much higher altitude than the records of most of the northeastern specimens which were taken mainly below 100 feet. A glance at the distribution of the Pennsylvania, New Jersey, New York and Rhode Island records shows such a close correspondence to the northeastern arms of the Upper Austral zone that it has prompted the author to examine the records of western New York. All of them come within the Upper Austral zone if we can think of sphagnaceous or marly areas as having Upper Austral influences in this latitude. In western New York this species has been taken at Ithaca at 400 feet, at Bergen (near Rochester) at 580–600 feet, at Junius (near Geneva) at 480–500 feet and at Westbury (near Oswego) at 420–440 feet. Strangely

* Bull. Amer. Nat. Hist., Vol. XXXVII, pp. 593-634.

enough, these 400–600 foot contours come where Merriam's Upper Austral arm of the southern shore of Lake Ontario is about to merge into the Transition zone; and the appearance at Ithaca is a southern austral extension of the Ontarian arm of the Upper Austral zone. It seems reasonable to prophesy that subsequent records in western New York will doubtless come below the 600–700 foot contours. If this species then be an Upper Austral form near the edge of the Transition zone we ought to find it at a higher altitude in North Carolina than in New York just as Mr. Dunn recorded it. And, herein, we begin to get some sort of a key to the apparent discontinuous records of this rare turtle.

In the light of this distribution and what follows it seems decidedly open to question whether or not the North Carolinian specimens should be considered a new species, *Clemmys nuchalis*.

Four characters enter into the diagnosis of this supposed new form and are given as follows: "a longer nuchal plate, with the temporal blotch forked ventrally, and the female, at least with a flatter and broader shell."

Of the nuchal plate in these North Carolinian turtles we have the following:

"The length of the nuchal plate ranges from 6 mm. to 7.1 mm. in the female *nuchalis*, and from 4 mm. to 6 mm. in female *muhlenbergi*. It is included in the length of carapace of female *muhlenbergi* from 13.6 to 16.4 times, and in that of female *nuchalis* from 12.7 to 13.2 times. No variation with age is apparent.

"The one male (*nuchalis*) agrees in bodily proportions with male *muhlenbergi*,—.

"The nuchal plate of the one male is 8 mm. long. Nuchals of male *muhlenbergi* range from 4.9 to 7 mm. in length. They are contained in the carapace 12.8 to 19 times, while that of *nuchalis* is included 12.2 times."

The nuchal plate in ten specimens varies in the males from 6 mm. to 8 mm. in length and from 2.5 mm. to 4.0 mm. in width, while in the females it is from 5.5 mm. to 7.5 mm. in length and 3.0 mm. to 3.5 mm. in width. The nuchal in the females is contained in the length of the carapace from 11.5 to 14.9 times; in the males, 12.3 to 14.8 times; and in a newly hatched young, 13.6 times. Accordingly these female *muhlenbergii* are more like the *nuchalis* diagnosed above and less like the *muhlenbergi* there given. The newly hatched young has the nuchal almost square, 2.5 mm. long and 3.0 mm. wide, i. e., wider than long and yet at adulthood the greater measurement comes in the length. The plate is quite variable in this transformation to a long narrow plate and the relative changes come in the width and not in the length of the plate. One of the adult males has no nuchal plate and a cephalic prolongation of the first neural replaces the obliterated nuchal.

Of the length, width and height of carapaces of these two forms, *C. nuchalis* and *C. muhlenbergi*, we have the following:

"The range in length of carapace of *C. nuchalis* is in the females 79–93 mm., the male measuring 98 mm.

"In *muhlenbergi* the same measurement gives for females 60–90 mm., and for males 84–98.

"— — ·—"

"With age, females of *muhlenbergi* show a gradual decrease in proportional width. They are always proportionally higher than female *nuchalis*. When small, female *muhlenbergi* are as broad as female *nuchalis*, but the adults are narrower. Thus, in females of *muhlenbergi* the width forms 72.22 to 81.6 per cent of the length. The same ratio in female *nuchalis* is 75.93 to 78.65 per cent. If, however, we omit the smallest two *muhlenbergi*, leaving in our ratios only those forms over 79 mm., we have for *muhlenbergi* 72.22 to 75.08, and for *nuchalis*, 75.93 to 78.65. The height forms 44.11 to 46.66 per cent of the length in female *muhlenbergi*, and 41.23 to 43.85 per cent in female *nuchalis*. The height of female *muhlenbergi* does not seem to change with age as the extremes of the above ratios are represented by the small ones. The ratio of height to width for female *muhlenbergi* is 55.55 to 63.33 per cent, for *nuchalis* 52.42 to 57.74 per cent, but omitting again the two small specimens of *muhlenbergi*, we have for that species 59.25 to 63.33 per cent."

The range in length of carapace of our females of *C. muhlenbergi* is from 82–93 mm., while in the males it is from 82–98.5 mm. In width the males are from 58.5–69 mm., and the females, 61–68.5 mm. The width forms 65.7–72.5 per cent of the length of our males, 73–76.7 per cent in the females, and 83.8 per cent in a newly hatched young. In height the males vary from 32–39 mm. and the females, from 37–39 mm. The height forms 36.5–41.0 per cent of the length of our males, 39.7–47.0 per cent in the females and 39.7 per cent in a newly hatched young.

In the accompanying plate figures 1 and 2 are tracings from the original description of *C. nuchalis* and the temporal spot appears in black in all the figures. The illustrations from eleven specimens considered in this paper show such variation that the shape or forking of the temporal spot proves most uncertain in characterizing these forms.

All in all it seems best to the writer to consider these North Carolinian forms as *C. muhlenbergi* and to expect specimens in intermediate places between Pennsylvania and North Carolina. The measurements of ten *C. muhlenbergi* follow:

Locality	Date	Sex	Carapace			Nuchal
			length	width	height	
Junius, N. Y.	July 18, 1908	♂	86	60	33.5	
Bergen, N. Y.	July 22, 1917	♂	82	59.5	32	6.5 x 3.5
Hackensack, N.J.	June 12, 1909	♂	89	58.5	36	6.0 x 2.5
Ithaca, N. Y.		♂	96	65.0	39	7.5 x 3.5
" "	May 5, 1915	♂	93	64.5	36	6.5 x 3.5
" "	April 9, 1910	♂	95.5	66.0	38	6.5 x 4.0
" "	June 10, 1917	♂	98.5	69.0	36	8.0 x 3.5
" "	April 9, 1910	♀	88.0	67.5	39	7.0 x 3.5
" "	May, 1908	♀	83.5	61.0	39	7.5 x 3.5
" "	June 10, 1917	♀	93.0	68.5	37	6.5 x 3.5
Junius, N. Y.	May 26, 1906	♀	82.0	61.0	39	7.5 x 3.5
Junius, N. Y.	July 18, 1908	yg	34.0	28.5	13.5	2.5 x 3.0

1. *Clemmys nuchalis* Dunn. His figure No. 6, Linville, N. C., Aug. 17, 1916.
2. *Clemmys muhlenbergi* (Schoepff). His figure No. 7.
3. " " Junius, N. Y., July 18, 1906. Newly hatched.
4. " " Junius, N. Y., May 26, 1906. Adult female.
5. " " Junius, N. Y., July 18, 1906. Adult male.
6. " " Ithaca, N. Y., May 5, 1915. Adult male.
7. " " Ithaca, N. Y. Adult male.
8. " " Ithaca, N. Y., April 9, 1910. Adult female.
9. " " Ithaca, N. Y., April 9, 1910. Adult male.
10. " " Ithaca, N. Y., June 10, 1917. Adult female.
11. " " Ithaca, N. Y., June 10, 1917. Adult male.
12. " " Bergen, N. Y., July 22, 1917. Adult male.
13. " " Hackensack, N. J., June 12, 1909. Adult male.

Clemmys insculpta (LeConte).

Our records of first appearance in the spring for the wood turtle vary between the two extremes of March 20, 1915, and May 14, 1906, and we have one mid-winter appearance on January 26, 1913. Three of the records come in April, two in March, and two in May. An average date at Ithaca, N. Y., appears to be about April 20. The records follow: May 14, 1906; April 27, 1908; March 28, 1910; April 27, 1912; April 20, 1913; May 3, 1914; March 20, 1915. All of these individuals were taken along our stream valleys or actually in the streams.

During the summer months we seldom see this species. It seems to be in the months of May and June that this species breeds. In our Cayuga Inlet valley through which a railroad (Lehigh Valley R. R.) runs we sometimes find them in late May or early June travelling along the railroad tracks or along the paralleling stream.

Some evidence discovered in 1914 may indicate an early May breeding or mating. In a semi-open sandy area of the Inlet valley where two side-streams open into it from different sides we found five of these turtles within a small area. Small willows furnished the only shade. Amongst the grass, against the sand or beside bunches of driftwood we found them. All looked so like the dirty sand that it was hard to find them. They were all females except one. On the same day in the same valley two other parties reported four or five more. One man captured one male and put it in a laundry bag but forgot it. About a week later he found it in good condition where he had left it.

Some of these turtles were brought home and for the first day we temporarily put them in a box in the kitchen. They soon got out and while we were at lunch in an adjoining room we heard a distinct yet subdued note not unlike that of a tea-kettle. We discovered that the male wood turtle was the whistler. We could hear the whistle 30 or 40 feet away. Whenever we brought the male to the middle of the room he would whistle. Once a female responded but its note was not very loud. Finally, we noticed that whenever a male approached a female he would

stick his head in close to the withdrawn head of the female and make the curious note. These observations were frequently made with these turtles.

The eggs probably hatch as a general rule in the fall, but a small wood turtle taken April 20, 1913, in the water of a small stream was a newly hatched form. It looked as if hatched that spring yet it may possibly have been hatched very late the previous fall. This specimen has its carapace 32 mm. long x 30 mm. broad, quite unlike the proportions of an adult male, 19.2 cm. x 13.6 cm., while two intermediate specimens have the following: 5.9 cm. x 5.5 cm.; 13.5 cm. x 11 cm. In this small specimen the posterior end of plastron is a real round emargination while in adults it is a straight-sided notch. In this newly hatched young, the concentric rings to come are only indicated at the periphery of each plate by a row of large tubercles. In the next older specimens the concentric lines move in development from the circumference toward the center and the radii are more prominent than the circuli. In the young specimens this central area is quite rough but in adults the small depressed center which is left becomes smooth.

In the fall of the year we find these turtles from September 20–October 15. Then, as in the spring, they are near or actually in our streams. This fall on October 1, I chanced on what I mistook for a dead wood turtle in the dammed up stretch of a woodland stream, which was 4 feet wide and 1 or 2 feet deep. The head was hanging perpendicularly downward as if it were caught or held by something. Upon endeavor to move it the turtle seemed very heavy and soon to my surprise it proved the male of a mated pair. The head looked to be hooked between the edge of the carapace and plastron of female turtle. Apparently this was not for purposes of holding the female but like the action of the whistling male previously recorded. The female's head looked to be retracted and the male's head had followed to the withdrawn head of the female. After these turtles were taken from the water the writer could not verify the actual head relations nor see the actual cloacal contact. For several minutes the male however maintained its grasp. With the prominent fore-claws the male held on the edge of the female's carapace near the suture between the first and second cephalic plates. The space between these two feet was barely the width of the male's head. The hind claws similarly held the next to the last pair of caudal marginals.

Oftentimes the texts mention that the tails of male turtles are larger than those of the females but the emphasis should be laid on the fact that the exposed preanal part of the tails of male wood turtles as in other species is twice as long as the corresponding part of the female's tail. The concavity of the plastron helps to accomplish ease of mating, but this elongation of the whole tail plus the pushing of the anus twice as far back greatly helps in the process.

Besides these sexual differences of structure already enumerated the scales on the front parts of the limbs, particularly of the fore-legs, are much more prominent in the male. The claws of the male are longer

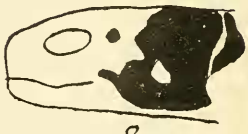
and especially much heavier than the corresponding shorter and more slender claws of the female. The plastra are different. In addition to concave male and convex female plastral characters, we find that there is another distinction. The rear edge of the plastron of the female may almost reach the corresponding edge of the carapace. For example, in two specimens of equal length (7 inches) the rear edge of the plastron of the female is only .5 cm. from the corresponding part of the carapace, but in the male 2 cm. separate the two edges.

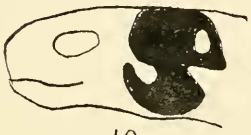
Many years ago the author found a mated pair of painted turtles in mid-August but this late mating just preceding entrance into hibernation seems quite unusual. Inasmuch as many male turtles in courtship endeavor to get in front of the females or stick their heads toward the withdrawn head of the females it may be that in their attempt to grasp the front edge of the carapace with their long claws the males may accidentally flay the females. That deliberate flagellation occurs and that the claws are longer for such a function seems rather far fetched.

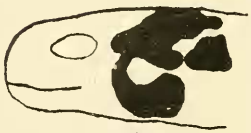
The female of this October 1 pair was lost by a friend but the male was retained for a month. About October 20 it strove to dig into the gravel of our cold cellar, the windows of which were open. Later we brought it to the laboratory and for a week it sought to find a dark corner for hibernation. It annoyed the students in its walking around so that it was put into a big hamper waste basket over 2.5 feet high. This basket had bulging sides and a smaller diameter at the top. From the bottom of this basket it would climb up on the inside and surmount the rim where it balanced awhile. Finally it would tumble to the floor. It repeated this climbing act eight different times and sometimes the students would put the basket beside them but frequently the turtle was so quiet that it would be at the parapet balancing before the student would be aware of its climbing.

Clemmys guttata (Schneider).

This best known N. A. form of this genus we do not propose to discuss at length except to present a few of our records of its occurrence. Our early dates of first appearance in the spring are April 3, 1903, at Hilton, N. Y. (near Rochester), April 5, 1909, at Auburn, N. Y., and April 7, 1909, at Hamburg, N. Y. (near Buffalo). It does not occur at Ithaca, N. Y., nor in the southern tier of western New York counties so far as can be determined. In the Upper Austral stretch from Oswego to Buffalo it occurs regularly. At Fort Erie, Ontario, we secured it in the last of June, 1914, in some drainage ditches which were put through a sphagneous area behind Crystal Beach. At Hamburg, New York, we took it in the same swampy woods in which *Hemidactylium scutatum*, *Ambystoma jeffersonianum* and *Pseudacris feriarum* lived. Near Rochester, as about Buffalo, it is not the turtle of our streams nor of the cat-tail swamps. Here the painted turtle is the common form. At Hilton,







Heads of *Clemmys muhlenbergi*.